#### card of course

|  |  |
| --- | --- |
| Subject name | Speech Recognition Models - Natural Language Processing Part 2 - Laboratory |

1. The placement of the subject in the study system

|  |  |
| --- | --- |
| 1.1. Field of study | Computer science |
| 1.2. Form and path of study | Full-time/Part-time |
| 1.3. Level of education | First-cycle studies |
| 1.4. Study profile | Practical |

|  |  |
| --- | --- |
| 1. 5. Specialty | Artificial intelligence |
| 1.6. Subject Coordinator | Dr Rafał Stęgierski |

2. General characteristics of the subject

|  |  |
| --- | --- |
| 2.1. Belonging to a subject group | Optional/practical |
| 2.2. Number of ECTS | 3 |
| 2.3. Language of lectures | English |
| 2.4. Semesters in which the subject is taught | V |
| 2.5.Criteria for selecting course participants | For specialization: Artificial Intelligence |

1. Learning outcomes and course delivery
   1. Subject Objectives

|  |  |
| --- | --- |
| No. | Subject Objectives |
|
| C1 | Developing text analysis skills using classical natural language processing (NLP) methods. |
| C2 | Using available tools and APIs for simple speech recognition and text analysis tasks. |
| C3 | Preparing students to implement basic NLP models in practical projects. |

* 1. Subject-specific learning outcomes, divided into knowledge , skills and competences , with reference to the directional learning outcomes

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| No. | Description of subject  learning outcomes | Reference to  directional effects  learning (symbols) | Method of implementation (mark "X") | | | |
| ST | | NST | |
| Classes at the University | Activities on  the platform | Classes at the University | Activities on  the platform |
| After passing the course, the student knows and understands **the knowledge** | | | | | | |
| W1 | Knows classical text processing techniques such as Bag-of-Words, TF-IDF. | I NF\_W10 INF\_W19 | X |  | X |  |
| W2 | Understands the basics of text embeddings such as word2vec and GloVe and their applications. | X |  | X |  |
| W3 | Knows the capabilities and limitations of speech recognition APIs such as Google Speech-to-Text, Azure Cognitive Services. | X |  | X |  |
| After passing the course, the student is **able** to: | | | | | | |
| U1 | Can prepare text data for analysis, perform preprocessing, tokenization and vectorization. | INF\_U13 INF\_U19 INF\_U21 | X |  | X |  |
| U2 | Is able to use ready-made models for text classification and sentiment analysis. | X |  | X |  |
| U3 | Can implement simple applications using the speech recognition API. | X |  | X |  |
| After completing the course, the student is ready to take part in **social competences.** | | | | | | |
| K1 | Is able to apply the knowledge and skills acquired to real social problems. | INF\_K02 | X |  | X |  |

3.3. Forms of teaching and their number of hours - Full-time studies (ST), Part-time studies (NST)

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Path | Lecture | Exercises | Design | Workshop | Laboratory | Seminar | Lecturer | Classes conducted using distance learning methods and techniques in the form of ………………. | Other | **ECTS points** |
| **ST** |  |  |  |  | 30 |  |  |  |  | 3 |
| **NST** |  |  |  |  | 15 |  |  |  |  | 3 |

3.4. Content of education (separately for each form of classes: (W, ĆW, PROJ, WAR, LAB, LEK, OTHER). It should be marked (X) how the given content will be implemented (classes at the university or classes on the e-learning platform conducted using distance learning methods and techniques)

TYPE OF CLASS: LABORATORY

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| No. | Content of the course | Reference to subject-specific learning outcomes | Method of implementation (mark "X") | | | |
| ST | | NST | |
| **Classes at the University** | **Activities on  the platform** | **Classes at the University** | **Activities on  the platform** |
| 1. | Overview of classical text representation methods, tokenization, Bag-of-Words, TF-IDF. | W1, U1 | X |  | X |  |
| 2. | Introduction to text embeddings, word2vec and GloVe, applications in text classification. | W2, U1 | X |  | X |  |
| 3. | Using speech recognition API, Google Speech-to-Text, Azure Cognitive Services. | W3, U3 | X |  | X |  |
| 4. | Sentiment analysis and text classification using ready-made models. | W2, U2 | X |  | X |  |
| 5. | Preparation of text data for analysis, preprocessing, tokenization. | W1, U1 | X |  | X |  |
| 6. | Implementing simple NLP pipelines in practical tasks. | W1, U2, K1 | X |  | X |  |
| 7. | Summary of classes and discussion of grades |  | X |  | X |  |

3.5. Methods of verifying learning outcomes (indication and description of methods of conducting classes and verification of achievement of learning outcomes and method of documentation)

|  |  |  |  |
| --- | --- | --- | --- |
| Subject Effects | Teaching methods | Methods of verifying learning outcomes | Documentation methods |
| KNOWLEDGE | | | |
| W1-W3 | Knowledge provided during the laboratory | Final test:  Students solve practical and theoretical tasks including:   1. Text preprocessing (tokenization, lemmatization, vectorization, TF-IDF). 2. Using text embeddings (e.g. word2vec, GloVe) in simple NLP tasks. 3. Analysis of speech recognition API applications (interpretation of operation results). | Colloquium archived on the platform |
| SKILLS | | | |
| U1-U3 | Practical classes performed at computer stations | Final test:  Students solve practical and theoretical tasks including:   1. Text preprocessing (tokenization, lemmatization, vectorization, TF-IDF). 2. Using text embeddings (e.g. word2vec, GloVe) in simple NLP tasks. 3. Analysis of speech recognition API applications (interpretation of operation results). | Colloquium archived on the platform |
| SOCIAL COMPETENCES | | | |
| K1-K2 | Practical classes performed at computer stations | Final test:  Students solve practical and theoretical tasks including:   1. Text preprocessing (tokenization, lemmatization, vectorization, TF-IDF). 2. Using text embeddings (e.g. word2vec, GloVe) in simple NLP tasks. 3. Analysis of speech recognition API applications (interpretation of operation results). | Colloquium archived on the platform |

3.6. Assessment criteria for the achieved learning outcomes

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Learning effect | For a grade of 3 or "pass."  the student knows and understands/is able to/is ready to | For a grade of 3.5, the student knows and understands/is able to/is ready to | For a grade of 4, the student knows and understands/is able to/is ready to | For a grade of 4.5, the student knows and understands/is able to/is ready to | For a grade of 5, the student knows and understands/is able to/is ready to |
| W | 51-60% of knowledge indicated in learning outcomes | 61-70% of knowledge indicated in learning outcomes | 71-80% of knowledge indicated in learning outcomes | 81-90% of knowledge indicated in learning outcomes | 91-100% of knowledge indicated in learning outcomes |
| U | 51-60% of skills indicated in learning outcomes | 61-70% of skills indicated in learning outcomes | 71-80% of skills indicated in learning outcomes | 81-90% of skills indicated in learning outcomes | 91-100% of skills indicated in learning outcomes |
| K | 51-60% of skills indicated in learning outcomes | 61-70% of skills indicated in learning outcomes | 71-80% of skills indicated in learning outcomes | 81-90% of skills indicated in learning outcomes | 91-100% of skills indicated in learning outcomes |

3.7. Literature

**Basic**

Géron A., "Uczenie maszynowe z użyciem Scikit-Learn i TensorFlow. Wydanie II", Helion, 2020.

**Supplementary**

Valentino Zocca, Gianmario Spacagna, Daniel Slater, Peter Roelants, "Deep Learning. Uczenie głębokie z językiem Python. Sztuczna inteligencja i sieci neuronowe", Helion 2018

4. Student workload - ECTS points balance

|  |  |  |
| --- | --- | --- |
| **Types of student activity** | **Student Load** | |
| **ST** | **NST** |
| **Classes requiring direct contact between the student and the academic teacher at the university premises** | **30** | **15** |
| Classes included in the study plan | 30 | 15 |
| **Student's own work** | **45** | **60** |
| Ongoing preparation for classes, preparation of project work/presentations/etc. | 25 | 30 |
| Preparation for passing classes | 20 | 30 |
| **TOTAL STUDENT HOURLY LOAD** | **75** | **75** |
| **Number of ECTS points** | **3** | **3** |

|  |  |
| --- | --- |
| Last change date | 30/09/2024 |
| The changes were introduced | INF Education Quality Team |
| The changes were approved | Arkadiusz Gwarda, M.A. |